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(71) Applicant

Casio Computer Co Ltd (Japan),
6-1 2-chome Nishi-shinjuku, Shinjuku-ku, Tokyo,
Japan

(72) Inventor

Morito Tamiya

(74) Agent and/or Address for Service

A A Thornton & Co,
Northumberland House, 303-306 High Holborn,
London WC1V 7LE

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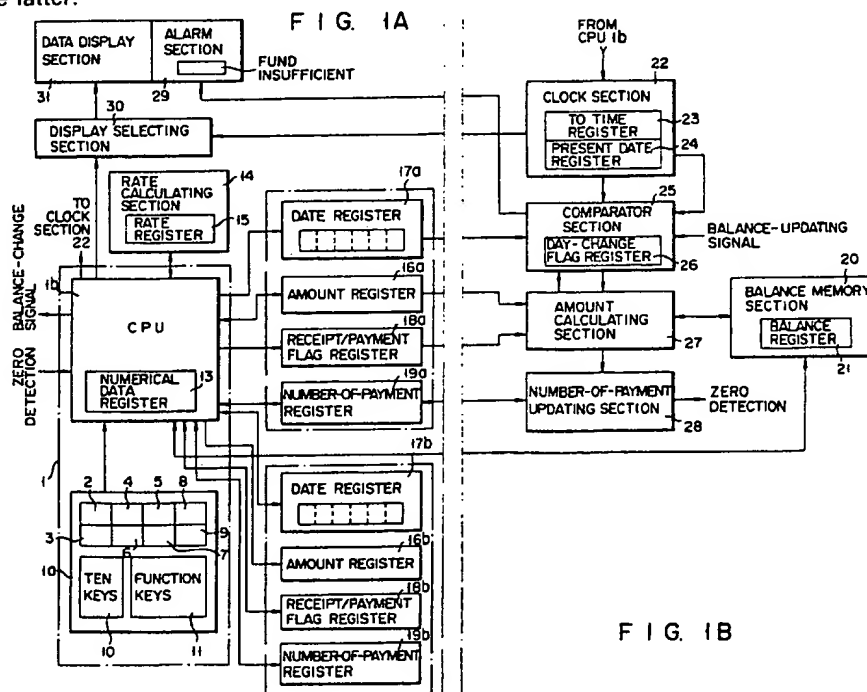
None

(58) Field of search

G4A

(54) Electronic account balance checking apparatus

(57) An electronic account balance checking apparatus comprises a balance memory (20), an amount memory (16a), a transfer date memory (17a), a present date memory (22), an operation means (27) and a comparator (25). The balance memory stores the balance of a deposit account, and the amount memory stores the amount to be transferred to or from the deposit account. The transfer date memory stores the date on which the amount is to be transferred, and the present date memory stores the present date. The comparator compares the data read from the transfer date memory with the data read from the present date memory. When the compared pieces of data are found to be identical, the operation means adds the amount data to, or subtracts the same from, the balance data, thereby updating the latter.



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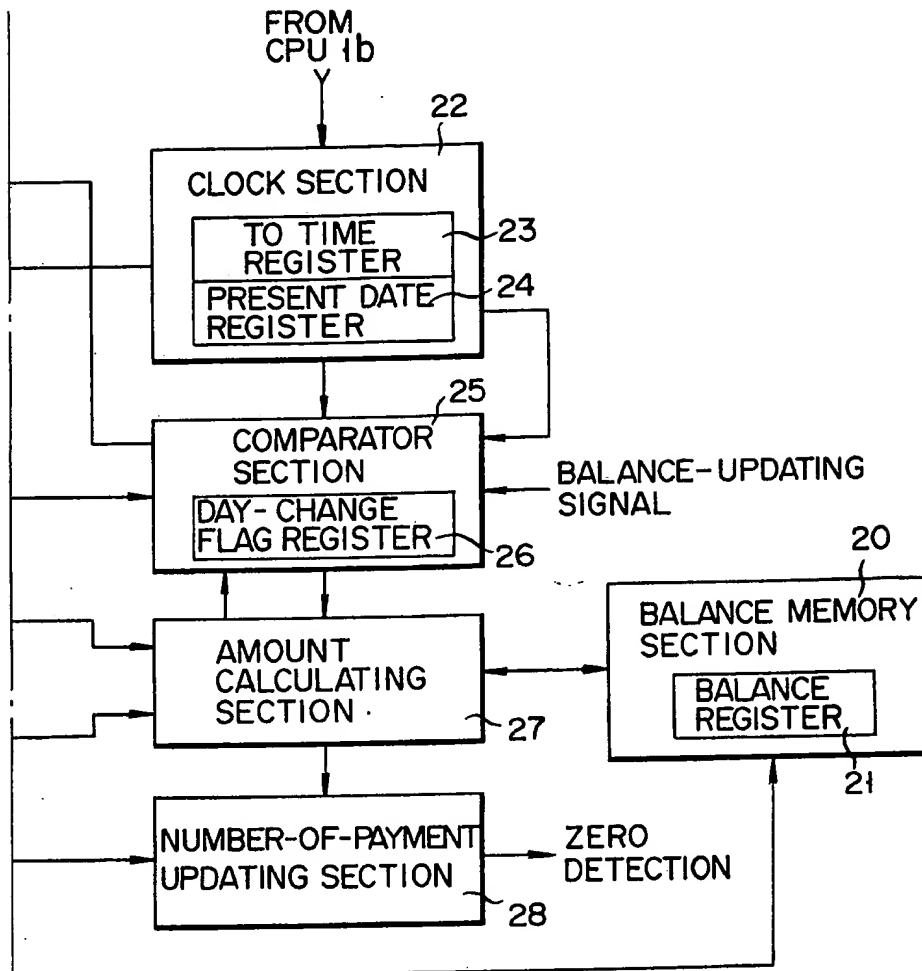


FIG. 1B

FIG. 2A

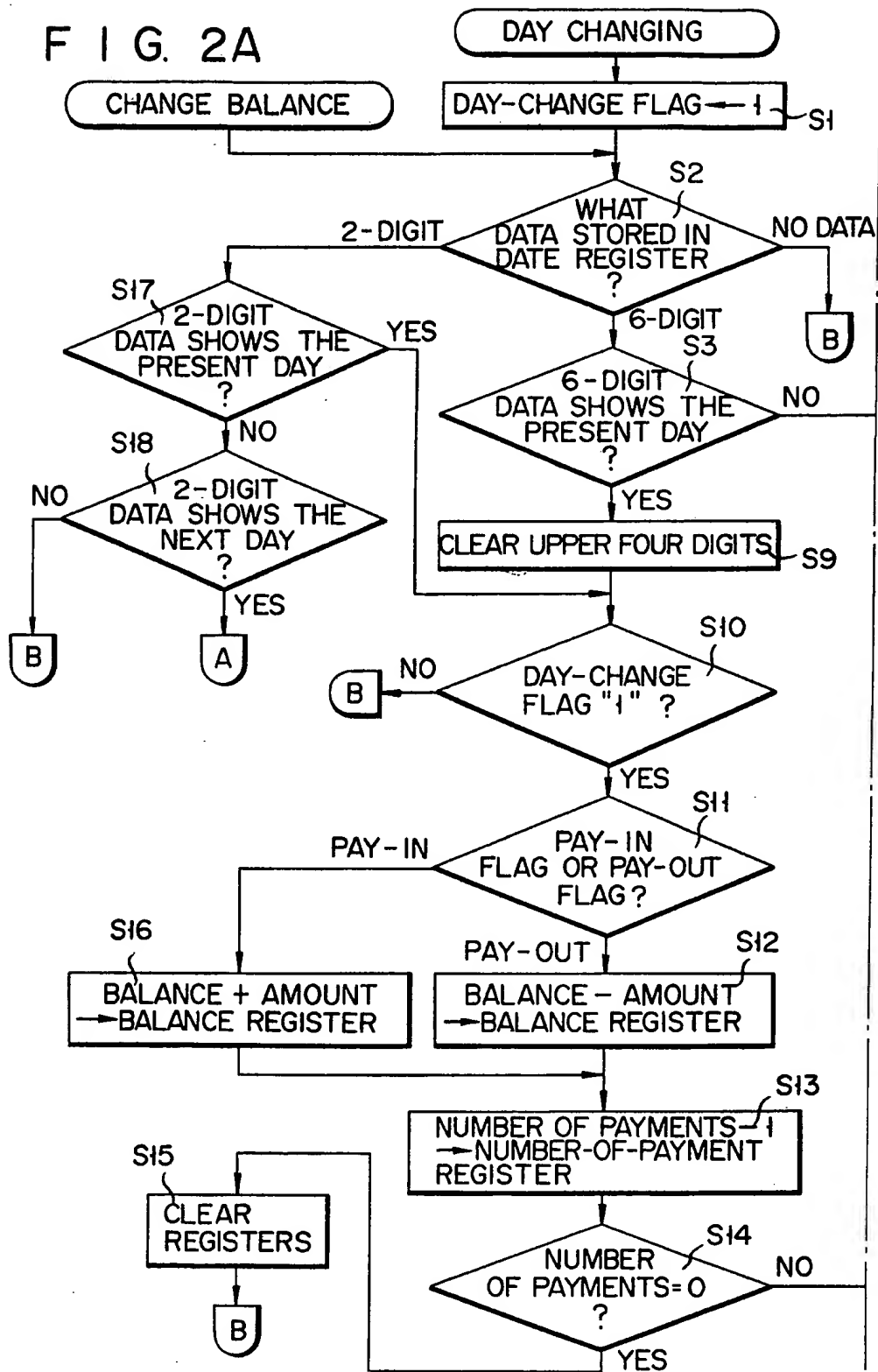


FIG. 2B

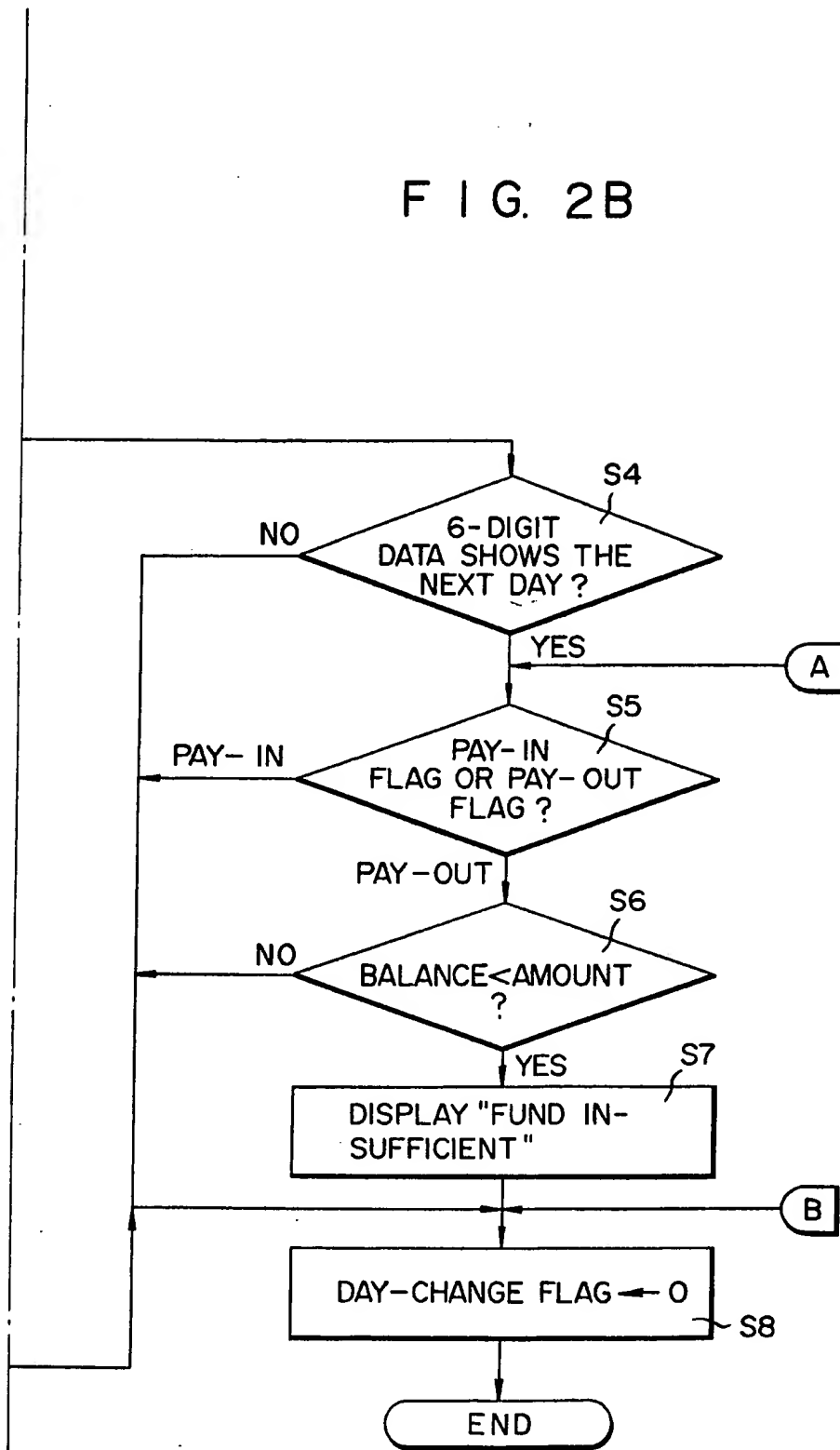
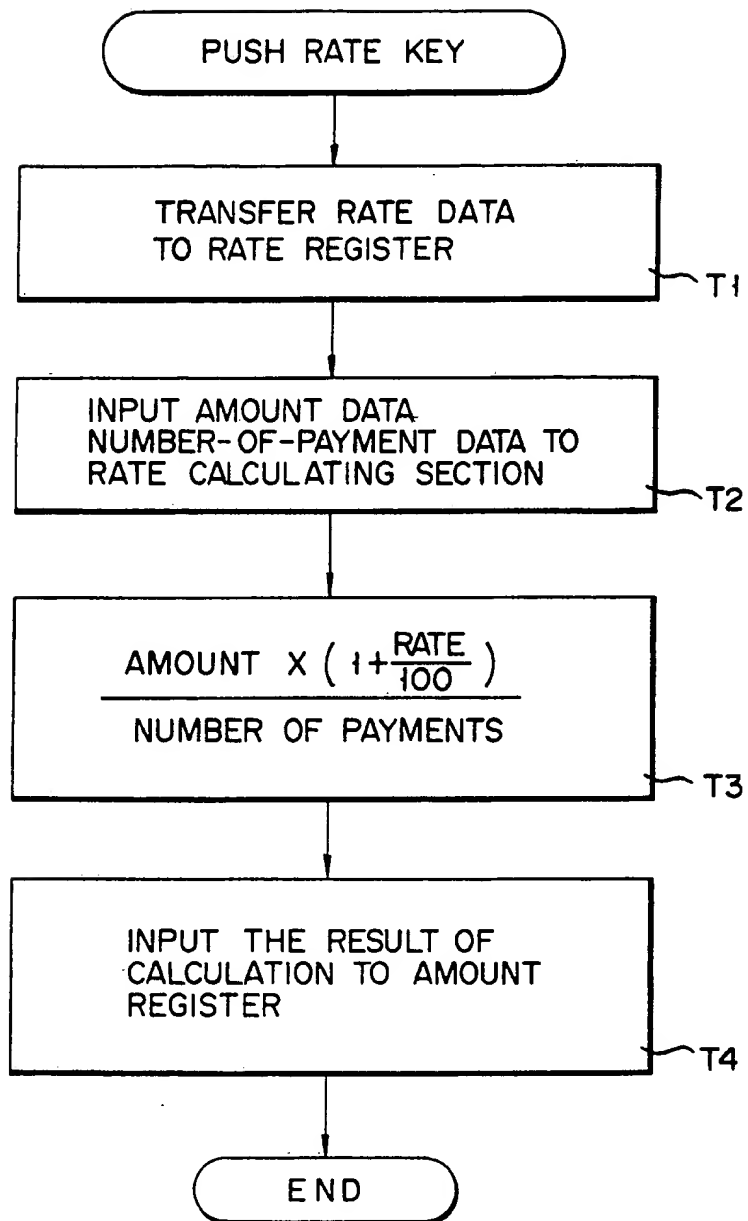
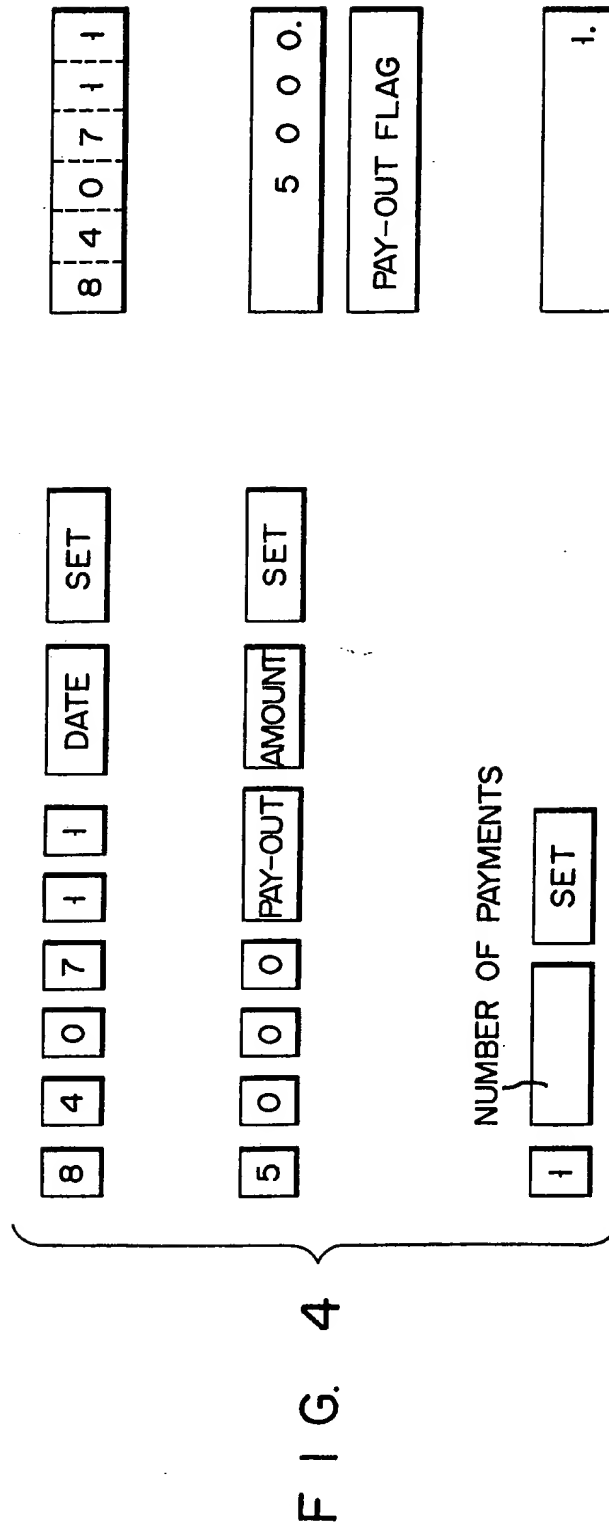


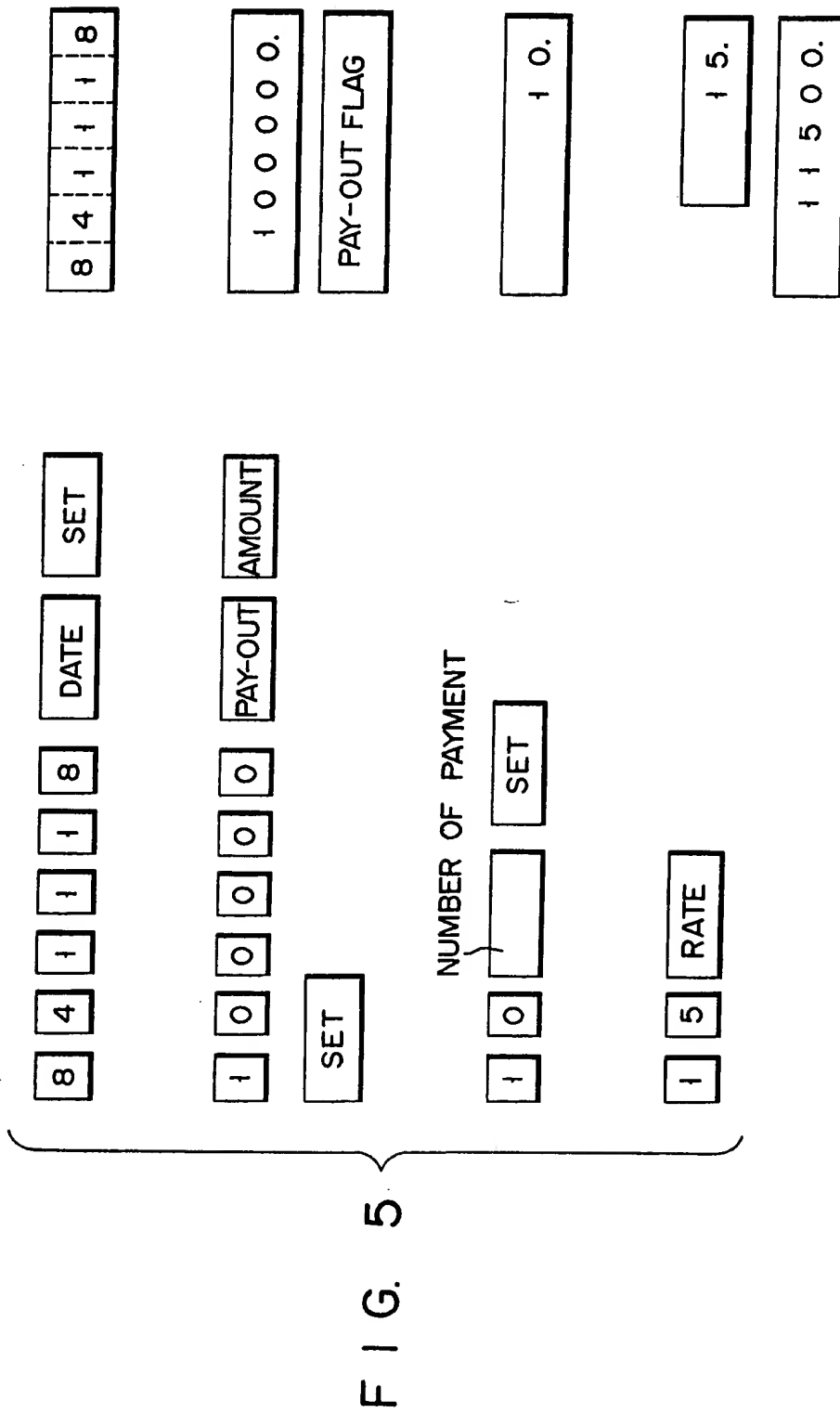
FIG. 3



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SPECIFICATION

Electronic account balance checking apparatus

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The present invention relates to an electronic account balance checking apparatus for storing data representing the balance of a deposit account.

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An account balance checking device is known which is designed to store and update the user's account balance. When the user buys things and pays by credit, he or she pushes the pay-out key of the device and then operates the ten keys, thus inputting the amount he has paid. The amount is automatically subtracted from the account balance stored in the device, thus updating the balance. Conversely, when a specific amount is paid into his deposit account, he pushes the pay-in key and inputs the amount received. In this case, the amount is automatically added to the account balance, thus updating the balance.

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When an automatic transfer is made to or from his deposit account, every month on a specified date for a specified amount, the user needs to operate the keyboard of the device to update the account balance. Since the bank does not inform him of such an automatic transfer, he often forgets to update the account balance. Consequently, there is a difference between the balance stored in the device and the actual account balance.

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The object of this invention is to provide an electronic account balance checking apparatus which can automatically update the account balance whenever money is transferred into or from the user's deposit account, with neither the pay-in or pay-out key being operated.

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According to the invention, there is provided an electronic account balance checking apparatus which comprises: data input means; balance memory means connected to the data input means for storing the balance of a deposit account; date memory means connected to said data input means and storing the present date, said date memory counting time, thus updating the date data; amount memory means connected to the data input means for storing the amount to be transferred to or from the deposit account; transfer date memory means connected to the data input means for storing the data representing the date on which the amount is to be transferred; comparator means connected to the date memory means and the transfer date memory means for comparing the present date with the date of the transfer; and operation means connected to the amount memory means and the comparator means for adding the amount data to, or subtracting the amount data from, the balance data stored in the balance memory, thereby updating the balance, when the comparator means detects

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that the present date is identical with the transfer date.

Once the user has input the transfer amount and the transfer date in the two memory means, respectively, this amount is automatically added to, or subtracted from, his deposit balance stored in the balance memory means, on the specified transfer data. In the case of installment payments or receipts, the user inputs the amount (including the interest) to the amount memory means. This amount is automatically subtracted from or added to his deposit balance every time the specified transfer date comes. When the user buys things and pays by credit and makes arrangements to pay in monthly installments, every monthly payment is automatically subtracted from his account balance stored in the balance memory means only if he has input the amount and the transfer date in the amount memory means and the transfer date memory means. He need not be bothered to operate the pay-out or pay-in key, or the ten keys when the transfer date comes.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Figs. 1A and 1B are a block circuit diagram of an electronic account balance checking apparatus according to the present invention;

Figs. 2A and 2B are a flow chart explaining how the apparatus of Fig. 1 checks an insufficient fund, how it adds the receipt amount to, or subtracts the payment from, the deposit balance;

Fig. 3 is a flow chart explaining how the apparatus calculates installment payments (including the interest) or installment receipts (including the interest);

Fig. 4 illustrates how to operate the keyboard of the apparatus in order to input the amount which should be paid and the date when it should be paid; and

Fig. 5 shows how to input the amount which should be paid in installments and the date when each payment should be made.

One embodiment of the invention, an electronic account balance checking apparatus, will be described with reference to the accompanying drawings.

As shown in Figs. 1A and 1B, the apparatus comprises a data input section 1 consisting of a keyboard 1a and a CPU 1b. Keyboard 1a has a date key 2, a time key 3, a number-of-payments key 4, an amount key 5, a pay-in key 6, a pay-out key 7, a rate key 8, a set key 9, ten keys 10 and function keys 11. Date key 2 is pushed to input the date when a specified amount should be paid or received, or to correct the data representing the present date. Key 4 is operated to input the number of times a particular amount should be paid or received as installments. Amount key 5 is operated to input the amount

to be paid or received. Pay-in key 6 is operated to specify that an amount should be paid into, and pay-out key 7 is pushed to specify that an amount should be paid out of, the account. Rate key 8 is operated to input the interest rate applied to the installment payments. Ten keys 10 are selectively pushed to input numerical data for date, amount of money, and number of payments. Set key 9 is operated to write the items of data input by operating keys 2-8 and ten keys 10. Function keys 11 are selectively operated to change the display mode of a display section 31.

The signals generated by operating these keys are supplied to CPU 1b and processed. The data input by operating ten keys 10 is stored in a register 13 provided in CPU 1b. This data represents the payment date, amount of money, number of payments, interest rate, deposit balance or present date, according to which key (except for ten keys 10 and function keys 11) has been pushed before ten keys 10 have been operated. The interest rate is input from CPU 1b to a rate register 15 provided in a rate calculating section 14. The total amount to be paid or received in installments and the number of payments are also input from CPU 1b to rate calculating section 14. Section 14 calculates the installment payment or receipt (including the interest). The installment payment or receipt is stored in an amount register 16a. The date of the scheduled payment or receipt is stored in a date register 17a. A pay-out flag or a pay-in flag is set in a receipt/payment flag register 18a. The number of payments is stored in a number-of-payments register 19a.

The date is represented by six digits, the first two representing the year, the third and fourth showing the month, and the last two indicating the day. When only the last two digits constitute an effective numerical value, they show the day on which the installment payment is due. A pay-in flag is set in register 18a when the amount input by operating ten keys 10 is to be paid into the user's deposit account. Conversely, a pay-out flag is set in register 18a when this amount is to be paid out of the deposit account.

The account balance input from keyboard 1a to CPU 1b is stored in a balance register 21 provided in a balance memory section 20. Similarly, the present time input from keyboard 1a to CPU 1b is stored in a time register 23 provided in a clock section 22, and the present date input from keyboard 1a to CPU 1b is stored in a present date register 24 also provided in clock section 22. The items of data stored in registers 23 and 24 are updated as clock section 22 counts time.

The present date data is supplied to a comparator section 25. When the day changes, clock section 22 supplies a day-change signal to comparator section 25. As a result, a "1" bit, or a day-change flag is set

in a day-change flag register 26 provided in section 25. Whenever a day-change flag is set in register 26, section 25 compares the present date with the specified date supplied from date register 17a. If the date is the same as the specified date or precedes the specified date, comparator section 25 supplies a coincidence signal to an amount calculating section 27. In response to the coincidence data, section 27 adds the amount data supplied from amount register 16a to, or subtracts this data from, the balance data supplied from balance memory section 20, according to whether a pay-in flag or a pay-out flag is set in receipt/payment flag register 18a. If the present date is the specified one, the result of the addition or subtraction is stored in balance register 21, and section 27 supplies a drive signal to a number-of-payments updating section 28. If the date precedes the specified date, the result is not stored in register 21, nor is a drive signal supplied to section 28. Section 28 takes one from the data stored in number-of-payments register 19a in response to every drive signal. When the data in register 19a is reduced to zero, section 28 supplies a zero detecting signal to CPU 1b. Upon receipt of the zero detecting signal, CPU 1b clears registers 16a, 17a and 18a.

If the present date precedes the specified date, section 27 supplies an insufficient fund signal to comparator section 25 when the balance is smaller than the payment due on the specified day. In response to the insufficient fund signal, section 25 supplies a drive signal to an alarm section 29, which displays a message "FUND INSUFFICIENT." When the data showing the amount to be paid into or out of the deposit account is supplied from keyboard 1a to CPU 1b, CPU 1b supplies a balance-updating signal to comparator section 25. The amount data is supplied from CPU 1b to amount calculating section 27 via amount register 16a. Section 27 detects whether or not the balance is smaller than this amount, and also adds this amount to, or subtracts the same from, the deposit balance stored in memory section 20.

The time data and present date data stored in registers 23 and 24 of clock section 22 are supplied via a display selecting section 30 to a data display section 31 and are then displayed. On the other hand, the specified date data, amount data, number-of-payments data, rate data and balance data are supplied from CPU 1b through section 30 to section 31 and are displayed.

It will now be explained how the electronic account balance checking apparatus of Figs. 1A and 1B operates, with reference to Figs. 4 and 5.

Suppose the user of the apparatus has bought 5000 yen worth of products by credit, and that this amount is to be automatically paid out of his deposit account on July 11,

1984. The user inputs "840711" to date register 17a by selectively operating ten keys 10, then pushing date key 2 and finally pushing set key 9. He then inputs "5000" to amount register 16a in a similar manner, and set a pay-out flag in receipt/ payment flag register 18a by pushing pay-out key 7. Thereafter, he inputs "1" in number-of-payments register 19a by pushing "1" key, number-of-payments key 4 and set key 9.

Every time clock section 22 supplies a data change signal to comparator section 25, the sequence of steps shown in the flow chart of Figs. 2A and 2B are started. Suppose the present day is three or four days before the specified date, i.e., July 11, 1984. When clock section 22 supplies a day-change signal to comparator section 25, a day-change flag is set in register 26 in step S1. In step S2, it is decided whether the specified date data consists of six, two, or zero digits. Since the date is 6 digit data, the flow goes to step S3. In step S3, comparator section 25 compares the specified date with the present date, determining if the 6-digit data represents the present day. The answer is no, in this instance. In step S4, it is judged if the data shows the next day. The answer is no, and the flow jumps to step S8. In step S8, the day-change flag is cleared. The flow ends here. If the date data is found, in step S2, to be an all-zero data, the flow jumps to step S8.

When the day preceding the specified date (i.e., July 10, 1984) comes, the flow advances from step S1 to S4. In step S4, the answer is yes. The flow goes to step S5, in which it is decided which flag is set in receipt/payment flag register 18a. Since the pay-out flag is set in register 18a, the flow advances to step S6. In step S6, it is determined whether the deposit balance is less than 5000 yen. If the answer is yes, alarm section 29 displays the message "FUND INSUFFICIENT" in step S7. The flow goes from step S7 to S8, in which the day-change flag is cleared. The user is thus informed that he needs to pay at least the insufficient fund into his deposit account on July 10, 1984.

If a pay-in flag is found, in step S5, to be set in register 18a, the flow jumps to step S8. If the deposit balance is found, in step S6, to be greater than 5000 yen, alarm section 29 does not display the message "FUND INSUFFICIENT," and the flow jumps to step S8.

Steps S4-S7 are carried out to determine whether or not the fund is insufficient on the day preceding the specified date when the payment is due.

When the specified day, i.e., July 11, 1984 comes, a day-change flag is set in step S1. In step S2, it is determined what kind of date data has been input, in date register 17a. Since it is 6-digit data that is stored in register 17a, the flow advances to step S3. Since this data represents the present day, the

flow goes to step S9, in which the upper four digits of the date data are cleared. Then, in step S10, it is judged whether or not the day-change flag is "1." The answer is yes, and the flow advances to step S11. In step S11, it is determined which flag is set in register 18a, a pay-in flag or a pay-out flag. Since a pay-out flag is set in register 18a, the flow goes to step S12. In step S12, amount calculating section 27 subtracts 5000 yen from the deposit balance and writes the difference in balance memory section 20. In step S13, number-of-payments updating section 28 takes one from the number-of-payments data, thus renewing the data, and inputs the renewed data to balance register 21. In step S14, it is decided if the number-of-payments data has been reduced to zero. If the answer is yes, section 28 supplies a detection signal to CPU 1b. The flow advances to step S15. In response to this signal, CPU 1b clears registers 16a, 17a and 18a, and comparator section 25 clears the day-change flag. As a result, in step S2, an all-zero data is detected, and the flow goes to step S8. Hence, 5000 yen is automatically subtracted from the data stored in register 21, when the specified date comes.

If a pay-in flag is found, in step S11, to be set in receipt/payment flag register 18a, the flow goes to step S16, in which 5000 yen is added to the balance, and the sum is input to balance register 21. If the number-of-payments data is found, in step S14, to be zero, the flow advances to step S8, and the day-change flag is cleared.

Steps S9-S16 are carried out to subtract a specified amount from, or add the same to, the data stored in balance register 21, when the specified day comes.

It will now be described how the apparatus operates when the user has bought an article worth 100,000 yen, and needs to pay ten installments with an interest rate of 15%, the first on November 18, 1984 and the last on August 18, 1985. As shown in Fig. 5, the user inputs "841118" to date register 17a by selectively operating ten keys 10, then pushing date key 2 and finally pushing set key 9. He then inputs "100000" to amount register 16a in a similar manner, and sets a pay-out flag in flag register 18a by pushing pay-out key 7. Thereafter, he inputs "10" in number-of-payments register 19a by pushing the "1" key and the "0" key, number-of-payments key 4 and set key 9. Further, he inputs "15" in register 13 by operating ten keys 10 and rate key 8.

CPU 1b detects that rate key 8 has been depressed, and carries out the sequence of steps shown in Fig. 3. More specifically, in step T1, CPU 1b judges that the data in register 13 represents the rate of interest, i.e., 15%, and transfers this data to rate register 15 of rate calculating section 14. The flow then goes to step T2, in which "100000" is

input from register 16a to section 14 and "10" is input from register 19a also to section 14. In step T3, CPU 1b multiplies "100000" by "1.15", and divides the product by "10," thus calculating the amount to be paid every month, i.e., 11,500 yen in this instance. In step T4, the calculated amount is stored in amount register 16a.

Thereafter, steps S1-S7 (Fig. 2A) are carried out, thereby checking the balance stored in register 21 on the day preceding the first pay-out date, i.e., November 10, 1984. Then, on November 11, 1984, steps S9-S12 are carried out, thereby subtracting 11,500 yen from the account balance. Since the upper four digits of the date data "841111" have been cleared in step S9, the remaining two digits are used to determine, in step S17, if the second pay-out day has arrived. If the answer is yes, the flow goes to step S10. If the answer is no, the flow advances to step S18, in which it is determined whether or not the two-digit data shows the next day. The flow goes to step S5 if the answer is yes in step S18, and goes to step S8 if this answer is no. All steps shown in Figs. 1A and 1B, except for steps S3, S4 and S9, are repeated until the last pay-out day, i.e., August 11, 1985.

When the user withdraws cash from, or deposits cash in, his account, he inputs the amount by operating keyboard 1a. CPU 1b writes this amount in balance register 21 and supplies a balance-updating signal to comparator section 25. Then, steps S2 et seq. are carried out. If the amount is to be withdrawn, steps S4-S7 are carried out on the day preceding the day when the user wishes to withdraw the cash. It is determined whether or not the fund is insufficient. No matter whether the cash is withdrawn or deposited, no day-change flag is set in step S1 on the day of the withdrawal or deposit. This fact is detected in step S10. It is therefore determined that CPU 1b has already updated the data in balance register 21. Thus, the amount is neither subtracted from, nor added to, the balance data stored in register 21.

In addition to registers 16a-19a, other sets of similar registers may be used, so that the data stored in the balances of a plurality of deposit accounts may be automatically updated in balance memory section 20 when monthly payments or monthly receipts are made. For instance, registers 16b-19b may be provided as shown in Figs. 1A and 1B.

In the embodiment described above, registers 16a, 17a and 18a are cleared when the data stored in register 19a is reduced to zero. Instead, they may be cleared when the present date is the last pay-out date in the case of installment payments.

Further, the apparatus of this invention may be designed to check the deposit balance two days before the pay-out date when the day

preceding the pay-out date falls on a Sunday or a statutory holiday. The day-change signal may be generated at the starting time of the day's work, not at twelve midnight. Moreover, the apparatus can record not only the installment payments and receipts, but also salaries, taxes, premiums, etc. Instead of displaying the message "FUND INSUFFICIENT," an alarm may be sounded to warn the user that the fund is insufficient. Such an alarm may be issued when the balance recorded in the apparatus is less than a specified amount (e.g., 1,000 yen) on the pay-out date, not on the day preceding the pay-out date.

CLAIMS

1. An electronic account balance checking apparatus comprising:

data input means;

balance memory means connected to the data input means for storing the balance of a deposit account;

date memory connected to said data input means and storing the present date, said date memory counting time, thus updating the date data;

amount memory means connected to the data input means for storing the amount to be transferred to or from the deposit account;

transfer date memory means connected to the data input means for storing the data representing the date on which the amount is to be transferred;

comparator means connected to the date memory means and the transfer date memory means for comparing the present date with the date of the transfer; and

operation means connected to the amount memory means and the comparator means for adding the amount data to, or subtracting the amount data from, the balance data stored in the balance memory, thereby updating the balance, when the comparison means detects that the present date is identical with the transfer date.

2. An apparatus according to claim 1, wherein said date memory means is comprised of at least one memory, and said amount memory means is also comprised of at least one memory.

3. An apparatus according to claim 2, further comprising memory means for storing data used to determine whether the input amount data represents the amount to be transferred to or from the deposit account.

4. An apparatus according to claim 3, further comprising counting means for counting the number of payments.

5. An apparatus according to claim 1, further comprising alarm means for informing the holder of an insufficient fund on the day preceding the date of transfer when the balance stored in said balance memory means is less than the amount to be transferred from the deposit account.

6. An electronic account balance checking apparatus, substantially as hereinbefore described with reference to the accompanying drawings.

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